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BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VIII.] New York, February, 1881. **[No. 2.**

§ 14. **The Fertilization of Alpine Flowers.**—In a newly-published, large octavo volume of 612 pages,* Dr. Hermann Müller makes us acquainted with his observations on the relations between Alpine flowers and insects, many of which, as well as some of the more important of his conclusions are already known to readers of *Nature*, *Kosmos*, etc. After describing the individual peculiarities of 422 species of phaenogams (the descriptions being supplemented by many excellent figures such as characterize his earlier work—the *Befruchtung der Blumen*), and enumerating the insects found on each, the author considers at length the significance of these peculiarities; discusses the adaptations of flowers to insect visits and the extent of these visits; the adaptations of insects for floral activity; and the variability of Alpine flowers; and makes an extended comparison of Alpine flowers with those of the lowland.

Much that is interesting might be culled from this part of the work, but we must content ourselves with a very few extracts. As was to be expected, the author finds that everywhere, even to the limit of phaenogamous life—the line of perpetual snow—the rule holds that cross-fertilization, constant or occasional, is provided for in every species, so that not a single flowering-plant is known which is incapable of being crossed at sometime. A series from the simplest anemophilous flower, whose only attraction to insects lies in its pollen, to the most highly adapted bee or butterfly flower, with fragrance, attractive form and coloration, and nectar, is fully traced and illustrated by many examples. A valuable feature of the work is the large number of comparative tables, which bespeak a great amount of labor on the part of the author, and enable the reader to see at a glance, relations which, without this aid, would require much study for their detection. These show very clearly that as flowers ascend in the scale of development, their visitors, though often decreasing in actual number of species, become limited more and more to certain groups whose floral activity is great, and from whose visits they receive the greatest profit.

In spite of the frequently-recorded scarcity of insects at high altitudes, under some conditions, the author says: "I have not been able to convince myself that, in the Alps, flowers as a whole are relatively less visited and crossed by insects than in the lowland." This results partly from the consolidation of vegetation into veritable flower-gardens—a circumstance very favorable to insect visits anywhere; and it is found that while, in the pleasantest weather, a moderately cool breeze suffices to quickly drive the insects under shelter, a quiet, sunny day, coming suddenly after several cold and rainy ones, brings them out in great abundance, their enforced conceal-

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**Alpenblumen, ihre Befruchtung durch Insekten, und ihre Anfassungen an dieselben.* (Engelmann, Leipzig, 1881.)

ment and fast having whetted their appetites and rendered them exceedingly active in their visits to the flowers. This is strikingly illustrated by the fact that 1877, which was cold, damp and rainy, but besprinkled with quiet, warm days, was not less productive of observations than the preceding summer, when, for weeks together, there was scarcely a cloud overhead. So while one day there may not be an insect visible, the next may witness them in such abundance that, as the writer expresses it, one could wish for twenty eyes and hands that nothing might escape him.

From a table showing the abundance and activity of the different orders of insects, it appears that in ascending the mountains the relative number of Coleoptera and Hymenoptera decreases, while that of Diptera and Lepidoptera increases. Thus, in the lowlands, of every 100 flower-visiting insects, 15.3 are Coleoptera, and 30 Diptera, while 43.6 are Hymenoptera, and but 9.3 Lepidoptera; but above the timber line, with 6.8 per cent. of Coleoptera, we have 43.6 per cent. Diptera, and with 18.3 per cent. of Hymenoptera, 30.7 per cent. of Lepidoptera. This renders intelligible the great abundance of narrow and partly-closed flowers, and of those which, like many species of *Saxifraga* and *Veronica*, are especially attractive to *Syrphidae* and other Diptera; whereas, without a knowledge of the relative distribution of the flower-frequenting insects it would be a hopeless riddle.

The author has followed the excellent plan, adopted in his earlier book, of compiling a systematic index to the insects observed, connecting with each species the flower it frequents and the degree of their adaptive development. It is to be regretted, however, that, in the alphabetical index to the plants observed, he refers only to the page on which their flowers are described and their visitors noted, and not to the places where they receive mention in the chapters devoted to generalization and conclusions, since numerous biological notes of value occur in these latter places.

Cambridge, Mass., Jan. 11, 1881. WILLIAM TRELEASE.

§ 15. **The Preservation of Pileate Fungi for the Herbarium.**— As well known to those who have studied the Fungi and have had some experience in attempting to preserve them for purposes of future reference, the most difficult kinds to manage are the fleshy pileate species commonly called "toadstools." A great number of experiments have been made from time to time with a view to discover some plan by means of which the forms and colors of these short-lived plants might, like those of other cryptogams and the phaenogams, be retained for an indefinite period ; but the results attained thus far have not proved in all respects satisfactory. In 1794, Dr. William Withering communicated to the *Transactions* of the Linnaean Society (Vol. ii., p. 263) a paper entitled "A new Method of Preserving Fungi," and in which he recommends that the specimen be immersed temporarily in a "pickle" consisting of an aqueous solution of sulphate of copper or of acetate of zinc, and afterwards be permanently kept in hermetically-sealed glass jars filled with water mixed with a small percentage of alcohol. In the first volume of